

Electrical Conductivity Spots Salty Soils

Electrical conductivity (EC) measures the amount of salt in a field as well as the field's composition—the amount of sand, clay, and organic matter. Farmers want to know the composition of their soil so that they can apply the correct number of seeds and chemicals to each section of their land. A farm with varying soil composition can be subdivided into sections according to EC data.

ARS agricultural engineer Hamid Farahani and his fellow researchers at the Water Management Laboratory in Fort Collins, Colorado, have shown that EC data can be a practical tool in determining how effective changes in irrigation water management practices have been in minimizing the buildup of salts in the crop root zone. In cases where there is no buildup of salts, any measured variability in EC would reflect changes in soil composition across the field.



Farahani uses a pickup truck to pull a machine that measures electrical conductivity of the soil. As the truck maneuvers over the field, two EC readings are taken every second: one that measures the top foot of the soil and another that measures the top three feet. A 140-acre field can be driven in 6 hours, giving about 14,000 data points.

A Global Positioning System (GPS) mounted on the truck links to satellites and tells a computer exactly where each data point is in the given field. This is similar to the devices found in some cars that can locate them if stolen.

Farahani puts the information collected into a special computer program to get an indication of the changes in salt loads across the fields. Different colors show the amount of EC within the field. With this machine, farmers can quickly get a map of their field's variability. Using the EC map as a guide, farmers only need to collect a few soil samples from each specific EC area to determine soil composition and decide whether or not to modify management.

Without this machine, it would take days to collect enough samples to make a similar map, and it would cost significantly more.

Farahani has gone back to survey farms 2 or 3 years later to find only small changes in EC, which indicates good irrigation practices. Drastic changes would have indicated problems in the overall management of the irrigation water.—By **David Elstein**, ARS.

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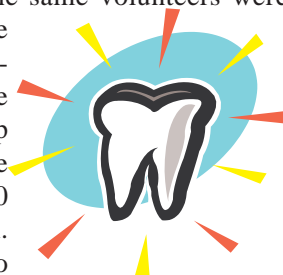
Supplementation Slows Tooth Loss

Calcium and vitamin D supplementation is known to slow the rate of age-related bone loss at various skeletal sites. But it's not been known how the same supplementation affects the jawbone supporting teeth, which some experts believe also becomes fragile with aging. Now scientists funded by the Agricultural Research Service (ARS) have found strong evidence that tooth loss in the elderly can be minimized if people get their recommended dietary allowance of both nutrients, which is 1,000 to 1,200 milligrams of calcium and 400 to 600 international units of vitamin D.

The scientists work in the Calcium and Bone Metabolism Laboratory at the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University in Boston. Lead researcher Elizabeth A. Krall worked with scientists at the Veterans Affairs Healthcare System and Boston University.

They looked at 145 healthy volunteers older than 65 who completed a 3-year, randomized, placebo-controlled trial, as well as a 2-year follow-up after they'd stopped taking the study's supplements. Teeth were counted at 18 months and 5 years. During the course of the randomized study, 13 percent of those who took the supplements lost one or more teeth, but more than twice that number (27 percent) in the placebo group lost teeth in the same period.

During the 2-year follow-up, the same volunteers were divided into two groups: those whose calcium intake was above 1,000 milligrams daily and those whose intake was below. "The high-calcium group had half the risk of tooth loss as those who consumed less than 1,000 milligrams of calcium," says Krall. Though vitamin D is required to absorb calcium, its intake was not independently related to tooth loss.



The percentage of the U.S. population aged 65 and older who are edentulous (have no teeth) is about 33 percent, according to *Oral Health in America: A Report of the Surgeon General*, issued in 2000. Tooth loss imposes psychological, social, and physical impairment on those affected.

Studies on nutrition's impact on tooth loss have been few. While more studies are needed to confirm the findings, the implications may lead to an expanded array of treatment and greater emphasis on nutrition education. If nutritional factors can be confirmed, such a relatively inexpensive measure could greatly affect public oral health.—By **Rosalie Marion Bliss**, ARS.

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